Machine Translation of JP 8-265099

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to a resonator type surface acoustic wave filter.
[0002]
[Description of the Prior Art]General classification of a surface acoustic wave filter will divide it into a transversal type and a resonator type. The resonator type surface acoustic wave filter has the feature of low-loss, high attenuation, a narrow-band, and matching circuit needlessness theoretically compared with the transversal type thing. The structural feature of this resonator type elastic-surfaces filter, The blind-like electrode which carries out the interconversion between an electrical signal and a surface acoustic wave, and the 1st grating antenna reflector provided by approaching the one end of this blind electrode, It is a point using the surface acoustic wave resonator which comprises the 2nd grating antenna reflector provided by approaching the another side end of this blind-like electrode. A resonator type surface acoustic wave filter is divided into the resonator type surface acoustic wave filter of **:ladder type circuitry, and a **:dual mode type resonator type surface acoustic wave filter depending on how to use the above-mentioned surface acoustic wave resonator. In the resonator type surface acoustic wave filter of ladder type circuitry, it has composition usually provided with two or more steps of portions which carried out ladder type circuitry from the magnitude of attenuation being small in it being one-step ladder type route constitution (namely, composition using two surface acoustic wave resonators).
[0003]
[Problem(s) to be Solved by the Invention]By the way, when it constitutes the thing provided with two or more steps of portions which are a resonator type surface acoustic wave filter of ladder type circuitry, and carried out ladder type circuitry, conventionally, Each had connected two or more surface acoustic wave resonators of the required number which comprised a blind-like electrode, the 1st grating antenna reflector, and the 2nd grating antenna reflector so that it might be based on the resonator type surface acoustic wave filter of the ladder type circuitry of the purpose. If it says by an example, the conventional resonator type surface

acoustic wave filter of two step pi type ladder type circuitry, for example, As shown in drawing 16, arrangement connection was made and each constituted the 1st which comprises the blind-like electrode 11a, the 1st grating antenna reflector 11b, and the 2nd grating antenna reflector 11c - the 3rd surface acoustic wave resonator 11x-11z so that it might become two step pi type ladder type circuitry. In this case, the 1st and 2nd surface acoustic wave resonators 11x and 11y serve as the ladder type circuitry portion 13a of the 1st step, and the 2nd and 3rd surface acoustic wave resonators 11y and 11z serve as the ladder type circuitry portion 13b of the 2nd step. The point of sharing the 2nd surface acoustic wave resonator 11y by the ladder type circuitry portions 13a of the 1st step and the 2nd step and 13b in each, and reducing the number of surface acoustic wave resonators here is well-known. In this drawing 16, the substrate with which 15 has piezoelectricity, and 17a show an input terminal, 17b shows 17c, and an earthing terminal is shown an output terminal and 17d, respectively. The representative circuit schematic of this two step pi type ladder type circuitry becomes what was shown in drawing 17 as everyone knows.

[0004]However, in the resonator type surface acoustic wave filter of conventional ladder type circuitry which showed and explained an example to drawing 16. Since the size will be determined by a number of stages of a portion, intersection length of a surface acoustic wave resonator, etc. who did ladder type circuitry, when attaining the miniaturization of the resonator type surface acoustic wave filter of ladder type circuitry, there was a limit naturally.

[0005]

[Means for Solving the Problem]According to this invention, then, a portion which carried out the ladder type circuitry of the surface acoustic wave resonator with the 2nd grating antenna reflector arranged by approaching the 1st grating antenna reflector and another side end that have been arranged by approaching a one end of a blind-like electrode and this blind-like electrode, In a resonator type surface acoustic wave filter which it had at least two steps, At least two surface acoustic wave resonators were provided with these at least one portion currently shared as the 1st grating antenna reflector of each two surface acoustic wave resonator, or 2nd grating antenna reflector even if small for one grating antenna reflector. Having said that it has here at least one portion which is sharing a grating antenna reflector, It is a meaning included also when two or more portions which can share a grating antenna reflector exist in a resonator type surface acoustic wave filter and it applies this invention only to a part of these two or more parts for other design reasons.

[0006]It is preferred to have composition which equipped with an increase part in reflectance a portion which sees from said at least two surface acoustic wave resonators of said grating antenna reflector currently shared, and hits in the center in implementation of this invention. Having said here that the above-mentioned center portion is equipped with an increase part in reflectance, It is thought that it mainly produces with balance of the increase effect in reflectance sufficient to two or more surface acoustic wave resonators which share a **:1 ** grating antenna reflector, ** : it is from reasons of thinking that it is [production of an increase part in reflectance] easier to provide an increase part in reflectance in a center portion of a

grating antenna reflector shared (for example, since there are few risks of an increase part in reflectance reaching even on a blind-like electrode even when a position gap arises in a manufacturing process). Or a center portion means even how much range, it is, but according to a design, it is decided actually. Although not restricted to this, as opposed to the geometric center of a grating antenna reflector shared, a field grade of the range of **5lambda can be considered to be the above-mentioned center portion, for example. Here, lambda is the wavelength of a surface acoustic wave treated with the filter concerned.

[0007]

[Function]In this invention, at least two surface acoustic wave resonators share one grating antenna reflector as each 1st grating antenna reflector or 2nd grating antenna reflector. Therefore, the number of grating antenna reflectors can be lessened compared with the case where each surface acoustic wave resonator has the 1st and 2nd grating antenna reflectors separately.

[0008]In the composition which provides the increase part in reflectance, although mentioned later for details, the influence of mutual between at least two surface acoustic wave resonators which are sharing one grating antenna reflector is more mitigable.

[0009]

[Example]Hereafter, some examples of this invention are described with reference to drawings. However, the size, shape, and arrangement relationship of each constituent are roughly shown to such an extent that any figure can understand these inventions. In each figure used for explanation, the same number may be attached and shown about the same constituent, and the overlapping explanation may be omitted. In each figure furthermore used for explanation, the same number as the constituent explained using drawing 16 and drawing 17 and the number used in drawing 16 and drawing 17 about the same constituent is attached and shown.

[0010]1. Explain the example (the 1st example) which applied this invention to the resonator type surface acoustic wave filter of the ladder type circuitry of the 1st example point ** and a two step pi type. Drawing 1 is a top view with which composition explanation of the resonator type surface acoustic wave filter 20 of this 1st example is presented.

[0011]The resonator type surface acoustic wave filter 20 of this 1st example, The substrate 15 which has piezoelectricity is equipped with the 1st - the 3rd surface acoustic wave resonator 11x-11z, ** also constitutes the portion 13a of the 1st step which carried out ladder type circuitry by the 1st surface acoustic wave resonator 11x and 2nd surface acoustic wave resonator 11y, Although the point which constitutes the portion 13b of the 2nd step which carried out ladder type circuitry by the 2nd surface acoustic wave resonator 11y and 3rd surface acoustic wave resonator 11z is the same as that of composition conventionally which was explained using drawing 16, The 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z that hit the parallel arm resonator (it mentions later for details) of these [1st] - the 3rd surface acoustic wave resonator 11x-11z, It differs from composition

conventionally in that the 1st - the 3rd surface acoustic wave resonator are arranged so that the one grating antenna reflector 11g may be shared. both the resonators 11x and 11z are adjacently arranged by arrangement that the 1st surface acoustic wave resonator 11x and one [3rd] gray TIGU antenna reflectors of each surface acoustic wave resonator 11z which hit a parallel arm resonator (it mentions later for details) specifically lap.

[0012]Therefore, the portion for which two surface acoustic wave resonators (parallel arm resonator) are sharing one grating antenna reflector as the 1st grating antenna reflector of each of these two surface acoustic wave resonator, or 2nd grating antenna reflector according to this 1st example, The example which it had one place is illustrated.

[0013]Since a field required in the case of this 1st example in order to form a grating antenna reflector can be reduced by one, the size of the resonator type surface acoustic wave filter of that part and two step pi type ladder type circuitry can be made smaller than before.

[0014]Between input terminals and earthing terminals (in the case of this 1st example between 15a and 15c), [in / with a parallel arm resonator / the resonator type surface acoustic wave filter of ladder type circuitry] Or it is the surface acoustic wave resonator connected in parallel between the output terminal and the earthing terminal (in the case of this 1st example between 15b and 15d). On the other hand, the surface acoustic wave resonator connected in series between an input terminal and an output terminal is called a series arm type resonator. Since parallel arm resonators or series arm resonators can perform the design of each grating antenna reflector as it is the same, the common use of a grating antenna reflector of them is attained.

[0015]Here, as the substrate 15 which has piezoelectricity, a lithium-niobate ($LiNbO_3$) board, suitable what are conventionally publicly known various, for example, lithium tantalate ($LiTaO_3$) board, for production of a surface acoustic wave device, a crystal substrate, etc. can be used.

[0016]Conventionally, the blind-like electrode 11a is a publicly known blind-like electrode, and can consist of blind-like electrodes currently rationalized according to the frequency treating the width, number, and pitch of a ctenidium. As a component of the blind-like electrode 11a, the aluminum alloy which contained aluminum, copper, or silicon severalpercent can be used, for example.

[0017]The 1st grating antenna reflector 11b, the 2nd grating antenna reflector 11c, and 11g of grating antenna reflectors currently shared each, For example, as the part was expanded and shown in drawing 2, it is two or more band-like metal membranes 110, and each longitudinal direction end can consist of cyclic structures which comprise the piezoelectric substrate part 15a exposed between two or more band-like metal membranes 110 by which common connection is carried out, and the metal membrane 110 band-like [these]. As a component of the metal membrane 110, the aluminum alloy which contained aluminum, copper, or silicon severalpercent can be used, for example like a blind-like electrode. Since the number of gratings of the grating antenna reflector 11g shared (for example, number of the band-like metal membrane 110) is explained below, it is good to use about at least 100. At the surface

acoustic wave resonator which comprises a blind-like electrode, the 1st grating antenna reflector, and the 2nd grating antenna reflector, if a high frequency electric signal is inputted into one terminal of the blind-like electrode 11a, a surface acoustic wave will occur in this blind-like electrode 11a. After spreading in the 1st and 2nd directions of a grating antenna reflector, respectively, it is reflected by these antenna reflectors, and this generated surface acoustic wave carries out the multiplex run of between the 1st and 2nd grating antenna reflectors. And a transmitted wave and reflected waves overlap on a blind-like electrode, the standing wave of a surface acoustic wave occurs, and resonance phenomena happen. For this reason, as one of the important points at the time of obtaining the desired characteristic by the surface acoustic wave resonator which comprises a blind-like electrode, the 1st grating antenna reflector, and the 2nd grating antenna reflector, The point which makes high reflectance in the grating antenna reflector in a surface acoustic wave resonator, and makes low the loss of the surface acoustic wave in a surface acoustic wave resonator is mentioned. If this is changed [a view], in order to inhibit the influence of mutual between two or more surface acoustic wave resonators (it will be each surface acoustic wave resonator of 11x and 11z if it says in the case of this example [1st]) which are sharing the grating antenna reflector 11g shared, It can be said that what is necessary is just to make reflectance in a grating antenna reflector high. Here, it is considered as the concrete method of making reflectance in a grating antenna reflector high, and there is the method of making the above number the number of the gratings which constitute an antenna reflector to some extent. This is explained with reference to drawing 3. Two or more grating antenna reflectors are constituted by making into a parameter the number N of the band-like metal membrane 110 which is a grating antenna reflectors [11b, 11c, and 11g] constituent, If the number N of the band-like metal membrane 110 is made or more into 100 as shown in drawing 3 as a result of investigating the reflectance gamma (gamma) which inputs a surface acoustic wave into each and appears in it, respectively, a surface acoustic wave will be reflected about 100%. In drawing 3, a vertical axis is the frequency which standardized the loss and the horizontal axis. As for the grating N [several] of the grating antenna reflector 11g shared, it is desirable that it is about at least 100 so that this drawing 3 may show. Of course, this idea is applicable also to the 1st and 2nd grating antenna reflectors 11b and 11c.

[0018]The input terminal 17a, the output terminal 17b, the earthing terminal 17c, and the material (Au) for wirebonding with 17d suitable as each component, for example, gold, can be used.

[0019]2. Explain the 2nd example, next the example (the 2nd example) which applied this invention to the resonator type surface acoustic wave filter of two step T type ladder type circuitry. Drawing 4 is a top view with which composition explanation of the resonator type surface acoustic wave filter 22 of this 2nd example is presented. The conventional resonator type surface acoustic wave filter 22a of two step T type ladder type circuitry was shown in drawing 5 as a comparative example of this 2nd example. the resonator type surface acoustic wave filter 22 of the 2nd example and a comparative example and the representative circuit

schematic of each 22a were shown in drawing 6.

[0020]The resonator type surface acoustic wave filter 22 of this 2nd example, The substrate 15 which has piezoelectricity is equipped with the 1st - the 3rd surface acoustic wave resonator 11x-11z, ** also constitutes the portion 13a of the 1st step which carried out ladder type circuitry by the 1st surface acoustic wave resonator 11x and 2nd surface acoustic wave resonator 11y, Although the point which constitutes the portion 13b of the 2nd step which carried out ladder type circuitry by the 2nd surface acoustic wave resonator 11y and 3rd surface acoustic wave resonator 11z is the same as that of composition (composition of drawing 5) conventionally, The 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z of these [1st] - the 3rd surface acoustic wave resonator 11x-11z the one grating antenna reflector 11g so that it may use in common, It differs from composition conventionally in that arrangement connection of the 1st - the 3rd surface acoustic wave resonator 11x-11z is made. specifically, both the resonators 11x and 11z are adjacently arranged by arrangement that the 1st surface acoustic wave resonator 11x and one [3rd] gray TIGU antenna reflectors of each surface acoustic wave resonator 11z lap. Also in the 1st example, although the 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z were sharing the one grating antenna reflector 11g, here, In the case of this 2nd example, the point that 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z of each hits a series arm resonator is different from the 1st example.

[0021]Since a field required like [in this 2nd example] the 1st example in order to form a grating antenna reflector can be reduced by one, the size of the resonator type surface acoustic wave filter of that part and two step T type ladder type circuitry can be made smaller than before.

[0022]3. Explain the 3rd example, next the example (the 3rd example) which applied this invention to the resonator type surface acoustic wave filter of three steps of ladder type circuitry. Drawing 7 is a top view with which composition explanation of the resonator type surface acoustic wave filter 24 of this 3rd example is presented. The conventional resonator type surface acoustic wave filter 24a of three steps of ladder type circuitry was shown in drawing 8 as a comparative example of this 3rd example. the resonator type surface acoustic wave filter 24 of the 3rd example and a comparative example and the representative circuit schematic of each 24a were shown in drawing 9.

[0023]The resonator type surface acoustic wave filter 24 of this 3rd example, The substrate 15 which has piezoelectricity is equipped with the 1st - the 4th surface acoustic wave resonator 11x, 11y, 11z, and 11u, ** also constitutes the portion 13a of the 1st step which carried out ladder type circuitry by the 1st surface acoustic wave resonator 11x and 2nd surface acoustic wave resonator 11y, The 2nd surface acoustic wave resonator 11y and 3rd surface acoustic wave resonator 11z constitute the portion 13b of the 2nd step which carried out ladder type circuitry, Although the point which constitutes the portion 13c of the 3rd step which carried out ladder type circuitry by the 3rd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u is the same as that of composition (composition of drawing 8)

conventionally, The 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z that hit the series arm resonator of these [1st] - the 4th surface acoustic wave resonator 11x-11u share the one grating antenna reflector 11g, It differs from composition conventionally in that arrangement connection of the 1st - the 4th surface acoustic wave resonator 11x-11u is made so that the 2nd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u that hit a parallel arm resonator may share the one grating antenna reflector 11h. Therefore, according to this 3rd example, the example provided with two portions with which two surface acoustic wave resonators are sharing one grating antenna reflector as the 1st grating antenna reflector of each of these two surface acoustic wave resonator or 2nd grating antenna reflector is illustrated.

[0024]Since a field required in the case of this 3rd example in order to form a grating antenna reflector can be reduced by two, the size of the resonator type surface acoustic wave filter of that part and three steps of ladder type circuitry can be made smaller than before.

[0025]4. Explain the 4th example, next two examples (the 4th example) which applied this invention to the resonator type surface acoustic wave filter of four step T type ladder type circuitry. Drawing 10 and drawing 11 are the resonator type surface acoustic wave filter 26 of the 1st mode of this 4th example, and a top view with which composition explanation of the resonator type surface acoustic wave filter 28 of the 2nd mode is similarly presented. the resonator type surface acoustic wave filter 26 of these 4th examples and the representative circuit schematic of 28 of each were shown in drawing 12.

[0026]4-1. the 1st voice -- it needs -- the resonator type surface acoustic wave filter 26 of the 1st mode of this 4th example, As shown in drawing 10, piezoelectricity to the substrate 15 which it has The 1st - the 5th surface acoustic wave resonator 11x, Have 11y, 11z, 11u, and 11v, and ** also constitutes the portion 13a of the 1st step which carried out ladder type circuitry by the 1st surface acoustic wave resonator 11x and 2nd surface acoustic wave resonator 11y, The 2nd surface acoustic wave resonator 11y and 3rd surface acoustic wave resonator 11z constitute the portion 13b of the 2nd step which carried out ladder type circuitry, The 3rd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u constitute the portion 13c of the 3rd step which carried out ladder type circuitry, Although the point which constitutes 13 d of portions of the 4th step which carried out ladder type circuitry by the 4th surface acoustic wave resonator 11u and 5th surface acoustic wave resonator 11v is the same as that of composition conventionally, The 1st surface acoustic wave resonator 11x, 3rd surface acoustic wave resonator 11z, and 5th surface acoustic wave resonator 11v that hit the series arm resonator of these [1st] - the 5th surface acoustic wave resonator 11x-11v share the one grating antenna reflector 11g, and it further, It differs from composition conventionally in that arrangement connection of the 1st - the 5th surface acoustic wave resonator 11x-11v is made so that the 2nd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u that hit a parallel arm resonator may share the one grating antenna reflector 11h. Therefore, the portion with which three surface acoustic wave resonators (series arm resonator) are sharing one grating antenna reflector as the 1st grating

antenna reflector of each of these three surface acoustic wave resonator, or 2nd grating antenna reflector according to the 1st mode of this 4th example, The example of a total of two covalent structures with the portion with which two surface acoustic wave resonators (parallel arm resonator) are sharing one grating antenna reflector as the 1st grating antenna reflector of each of these three surface acoustic wave resonator or 2nd grating antenna reflector is illustrated.

[0027]Since a field required in the case of the 1st mode of this 4th example in order to form a grating antenna reflector can be reduced by three, the size of the resonator type surface acoustic wave filter of that part and four step T type ladder type circuitry can be made smaller than before.

[0028]4-2. the 2nd voice -- it needs -- the resonator type surface acoustic wave filter 28 of the 2nd mode of this 4th example, equipping with the 1st - the 5th surface acoustic wave resonator 11x, 11y, 11z, 11u, and 11v the substrate 15 which has piezoelectricity as well as the filter 26 of the 1st mode -- the 1-, although the point provided with the portions 13a-13d which carried out ladder type circuitry up to the 4th step is the same, The 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z that hit the series arm resonator of these [1st] - the 5th surface acoustic wave resonator 11x-11v share the one grating antenna reflector 11g, The 3rd surface acoustic wave resonator 11z and 5th surface acoustic wave resonator 11v that similarly hit a series arm resonator share the one grating antenna reflector 11i, It differs from composition conventionally in that arrangement connection of the 1st - the 5th surface acoustic wave resonator 11x-11u is made so that the 2nd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u that hit a parallel arm resonator may share the one grating antenna reflector 11h. Therefore, according to the 2nd mode of this 4th example. Two surface acoustic wave resonators (series arm resonator) the portion which is sharing one grating antenna reflector as the 1st grating antenna reflector of each of these two surface acoustic wave resonator, or 2nd grating antenna reflector Two places, The example of a total of three covalent structures with the portion with which two surface acoustic wave resonators (parallel arm resonator) are sharing one grating antenna reflector as the 1st grating antenna reflector of each of these two surface acoustic wave resonator or 2nd grating antenna reflector is illustrated.

[0029]Since a field required in the case of the 2nd mode of this 4th example in order to form a grating antenna reflector can be reduced by three, the size of the resonator type surface acoustic wave filter of that part and four step T type ladder type circuitry can be made smaller than before.

[0030]5. By making the number of a grating about into at least 100 about the grating antenna reflectors 11g, 11h, and 11i shared between the example above-mentioned 5th 1st - the 4th example. Although it said that the influence of mutual of two or more surface acoustic wave resonators which are sharing the grating antenna reflector concerned can be inhibited, it became clear by research of the artificer concerning this application that a small ripple still arises on a transmission characteristic curve in detail. This point is first explained with

reference to drawing 13 (A) and (B).

[0031]The transmission characteristic of the resonator type surface acoustic wave filter 24a explained with reference to drawing 8 which mentioned the transmission characteristic shown in drawing 13 (A) as the conventional example of the resonator type surface acoustic wave filter of three steps of ladder type circuitry, i.e., a comparative example of the 3rd example, The transmission characteristic shown in one drawing 13 (B) is this invention (hereafter). the invention which shares a grating antenna reflector -- saying -- it is the transmission characteristic of the resonator type surface acoustic wave filter 24 explained with reference to drawing 7 quoted as the resonator type surface acoustic wave filter, i.e., 3rd example, of three steps of applied ladder type circuitry. However, all are the characteristics in the filter for center frequency f_0=800MHz.

[0032]By comparing each transmission characteristic shown in drawing 13 (A) and (B), so that clearly, When the invention which shares a grating antenna reflector is applied, it compares with the case of a comparative example, Although the pole of the decay area by the side of low frequency becomes clear to a pass band and the decay area by the side of low frequency is improved from a pass band (portion shown by P among drawing 13 (B)), it turns out that a small ripple arises in a pass band on the other hand (portion shown by Q among drawing 13 (B)).

[0033]The surface acoustic waves generated in the 1st surface acoustic wave resonator 11x and 3rd surface acoustic wave resonator 11z (or the 2nd surface acoustic wave resonator 11y and 4th surface acoustic wave resonator 11u) in the resonator type surface acoustic wave filter 24 of the 3rd example when it was shown in drawing 7 this ripple, It did not become total internal reflection with the grating antenna reflector 11g (or 11h) which these resonators share, but it leaked to the surface acoustic wave resonator side of another side in part, and the multiple reflection wave was generated between the blind-like electrodes 11a of both resonators, and this became a spurious ingredient and has arisen. There is this ripple, respectively, when becoming a problem depending on the specification required of a resonator type surface acoustic wave filter and not becoming, but it is more desirable to be reduced technically. And if it is done so although the number of gratings of the grating antenna reflector shared is described that what is necessary is just to make 100 into the number exceeded substantially in order to reduce this ripple, it will become a problem, when sharing a grating antenna reflector and attaining the miniaturization of a resonator type surface acoustic wave filter. So, in this 5th example, the increase part in reflectance is provided in the portion which sees from at least two surface acoustic wave resonators which are sharing this of the grating antenna reflector currently shared, and hits in the center. Hereafter, two examples explain concretely.

[0034]The resonator type surface acoustic wave filter 30 of the 1st mode of the 5th example, As shown in drawing 14, from the surface acoustic wave resonators 11x and 11z which are sharing this of the grating antenna reflector 11g currently shared, see and A center portion, It

sees from the surface acoustic wave resonators 11y and 11u which are sharing this of other grating antenna reflectors 11h currently shared, and a center portion is independently equipped with the increase part 31 or 33 in reflectance, respectively.

[0035]The resonator type surface acoustic wave filter 35 of the 2nd mode of the 5th example, As shown in drawing 14, from the surface acoustic wave resonators 11x and 11z which are sharing this of the grating antenna reflector 11g currently shared, see and A center portion, It sees from the surface acoustic wave resonators 11y and 11u which are sharing this of other grating antenna reflectors 11h currently shared, and has the increase part 37 in reflectance over a center portion.

[0036]These reflective enhancement parts 31 and 33 and 37 each can be constituted with the thin film of a suitable material for the improvement in reflectance which said center portion of the grating antenna reflector shared was made to deposit. Since the discontinuity of acoustic impedance and a mass load effect increase in the portion which provided this thin film as it is such a thin film, compared with the case where it does not have an increase part in reflectance, the reflectance of the surface acoustic wave in this portion can be raised. It is mentioned, the metal membrane, for example, the Au membrane etc., etc. which are used as an example of the thin film which constitutes the increase part in reflectance as formation films, such as an insulator layer, for example, a SiO_2 film, used as a protective film of a surface acoustic wave filter, etc., and an input terminal of a surface acoustic wave filter, for example. Here, when it constitutes the increase part in reflectance from insulator layers, such as a SiO_2 film, this film can be used in the 1st mode of the above, and each 2nd mode. However, when it constitutes the increase part in reflectance from metal membranes, such as Au membrane, this film can be applied only to the 1st mode (namely, mode which provides the increase part in reflectance independently for every grating antenna reflector shared) of the above. Because, since this metal membrane will cross the signal wire which connects between resonators and an antenna reflector and a signal wire will short-circuit it as a result when the metal membrane as an increase part in reflectance is provided over two grating antenna reflectors shared, it is because it is not desirable on the characteristic. Although the thickness of the thin film which constitutes the increase part in reflectance is chosen according to a design, For example, when using a metal membrane, and forming the input terminal of a surface acoustic wave filter, the increase part in reflectance is also considered that the same grade as the thickness (for example, about 200 nm) of the input terminal of a surface acoustic wave filter may be sufficient as producing simultaneously.

[0037]Although some examples of this invention were described in ****, this invention is not restricted to an above-mentioned example. For example, the number of stages of the portion which carried out ladder type circuitry can apply this invention also by five or more steps of cases. If it is arrangement in consideration of the point that the miniaturization of the point and filter which can share a grating antenna reflector can be attained, even if the method of arrangement of a surface acoustic wave resonator is arrangement of those other than an

example, it is easy to be natural [the method].

[0038]Although the 5th above-mentioned example showed the example which provides the increase part in reflectance to the resonator type surface acoustic wave filter provided with three steps of portions which carried out ladder type circuitry, of course, the thought which provides the increase part in reflectance is applicable also to the surface acoustic wave filter of other number of stageses other than three step.

[0039]

[Effect of the Invention]According to the resonator type surface acoustic wave filter of this invention, so that clearly from the explanation mentioned above. The portion which carried out the ladder type circuitry of the surface acoustic wave resonator with the 2nd grating antenna reflector arranged by approaching the 1st grating antenna reflector and another side end that have been arranged by approaching the one end of a blind-like electrode and this blind-like electrode, In the resonator type surface acoustic wave filter which it had at least two steps, At least two surface acoustic wave resonators are provided with these at least one portion currently shared as the 1st grating antenna reflector of each two surface acoustic wave resonator, or 2nd grating antenna reflector even if small for one grating antenna reflector. For this reason, since the number of grating antenna reflectors can be lessened compared with the case where each surface acoustic wave resonator has the 1st and 2nd grating antenna reflectors separately, the miniaturization of that part and a resonator type surface acoustic wave filter can be attained.

[0040]In the composition which provides the increase part in reflectance, since the influence of mutual between at least two surface acoustic wave resonators which are sharing one grating antenna reflector is more mitigable, it is mitigable that a lip arises in a transmission characteristic, for example. Since reduction of the gray TIGU number of the grating antenna reflector shared is also expectable, the further miniaturization of a resonator type surface acoustic wave filter is also expectable.

[Translation done.]

Replacement Sheet
Approved for Entry
1/29/08 BS

"REPLACEMENT SHEET"

FIG. 6A

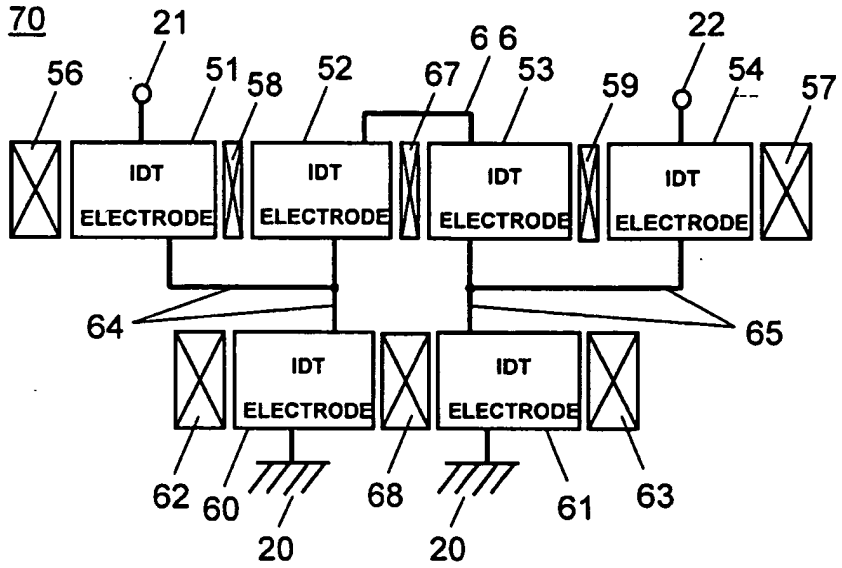

FIG. 6B